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AUTHOR Duncan, Marvin E.
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ABSTRACT

Designed to serve as an introduction to instructional development for the teacher or graduate student who has not read extensively in the field, this chapter presents an operational definition of the instructional development process; explores the human dimensions of the process; provides graphic models of instructional development; and makes practical suggestions for implementing and diffusing instructional development. Three models of instructional development--two by Hamreus and one by Glaser--are used to illustrate: (1) the nature of instructional development; (2) the steps in the instructional development process; (3) the human aspects of instructional development; (4) the diffusion of instructional development; and (5) where instructional development fits into educational technology and the public view of education. The text is supplemented with three figures, and a 24-item bibliography is provided. (Author/EW)

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CHAPTER II

THE INTRICACIES OF INSTRUCTIONAL DEVELOPMENT

By

Marvin E. Duncan

A vast storehouse of information is available for learning by students of all ages. Much of this information may be effectively learned in an environment far different from the school's traditional four walls. It has been found that as much as 85 per cent of the learning occurring in a course may result from interactions with sources other than the teacher (Smith and McAshan, 1964) and thus it is unquestionable that learning does occur outside of the classroom. Assuming that students will learn both "because of" and "in spite of" the teacher, it becomes of paramount importance for teachers to perform their assigned tasks competently in order to insure that the learning which occurs in the school learning environment is done efficiently and effectively. The question thus becomes: how do teachers best facilitate learning in a situation in which they control the parameters?

Parameters of learning in the classroom are usually controlled by teachers. Traditionally, a teacher's responsibility has been and continues to include the selection of course objectives, the selection of content, the selection of instructional techniques, and the selection of evaluative instruments. These selections not only shape the learning environment, but in so doing, force the student into a somewhat passive role in the learning process. This is not to suggest that learning cannot be passive. However, totally restricting learning to a passive mode means the total exclusion of the active role and therefore the reduction of the learning options.

The material to be learned constitutes a learning hierarchy. For example, what is learned earlier in time forms a foundation for what is to be learned later in time.

A learning hierarchy suggests the sequencing of instruction through the establishing of priorities. The financial control of educational institutions remains basically with state legislatures, and this control is being exercised less benevolently and more critically than in the decades of the recent past. Presently, pressure is being applied from various publics, who are asking that educators and the educational system be accountable to *someone* for *something*. University systems are attempting to identify

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nonfunctional and duplicate programs in an effort to maximize the effectiveness with which funds are spent. Individual institutions within these systems are now being held accountable for the productivity of their instructional programs. As this emphasis upon accountability seeps down to the classroom teachers who act as managers of the learning environment, it becomes apparent that they must make every effort to insure that learning occurs at optimal levels.

Teacher expectations can serve as an external source of motivation for the learner. It cannot be overemphasized that the conditions under which the student attempts to learn are of great importance and should be given due consideration. Failure to consider the interaction of the environment within which learning is to occur with the material to be learned can lead to an unprofitable situation for both the learner and the teacher.

Apparently, what is needed in order to avoid this frustrating situation is a systematic process for designing, implementing, and evaluating the total instructional program. Such a process exists, and is called instructional development. Nonetheless, instructional development is not a panacea for all educational problems. Rather, it is a systematic process in which basic principles of teaching and learning are synthesized and applied to the classroom learning situation. The writer recognizes that one chapter cannot adequately explicate all of the components of the instructional development process. Thus, this presentation is selective in nature and is designed to provide insights with respect to: (1) an operational definition of the instructional development process, (2) the human dimensions of the process, (3) the use of graphic models in explaining the process, and (4) practical suggestions for the developer in implementing and diffusing the process. A summary and commentary are also provided.

DEFINITION: A CONCEPTIONAL FRAMEWORK

Much has been written about instructional development in recent years. Most writers appear to agree that instructional development is a process of systematically designing, sequencing, implementing, evaluating, and constantly monitoring instruction with the intent of improving its quality and effectiveness and thereby improving learning.

Hamreus (1971, pp. 2–3) discusses four characteristics which he contends must be carefully analyzed and put into proper perspective with respect to instructional development endeavors. These characteristics are: (1) goal definition, (2) goal relevance, (3) systematization, and (4) evaluation. Goal definition means that the goals of the system must be clearly defined. Goal relevance is the concept that instructional goals, although they may be clearly defined, serve no real purpose unless

they are directly related to the parameters of the educational system in which they are embedded. Systematization involves the concept that development efforts must proceed in a systematic way in order to achieve the intended goals. Evaluation connotes constant monitoring and assessing of instructional development efforts. Needless to say, the constant monitoring and assessing of development efforts is important if wise decisions are to be made in choosing among developmental alternatives. It thus appears that instructional development is inextricably bound to the notion of equifinality (Miller, 1965) since it affords means by which one can identify, in a systematic manner, various paths toward the goal of improving the quality of instruction and thus of learning.

Instructional development is often referred to as the systems approach. In fact, in the literature on the subject, the systems approach is sometimes defined in the same terms used to define instructional development. Confusion also abounds with respect to the definitions of instructional technology and educational technology. The systems approach, instructional development, instructional technology and educational technology, as referred to herein, are used interchangeably. Perhaps confusion over terminology may be attributed to the fact that individuals in technology come into the field from different philosophical and educational backgrounds (Thiagarajan, 1974). Instructional development is a system in the sense that system theories are basic to the development process. What, then, is a system? A system is an assemblage of components designed to function in an integrated fashion in order to achieve predetermined objectives. "The systems approach is a systematic attempt to coordinate all aspects of a problem toward the achievement of specific objectives" (Erickson and Curl, 1972), and is product oriented. The coordinated efforts include the use of all of the resources which the system has at its disposal. Utilization of all available resources implies the creation of a man-machine system. A man-machine system is a set of planned procedures in which man and machine capabilities are integrated in such a manner as to achieve results which man could not achieve alone. A man-machine system is a marriage of man and machines with increased efficiency and productivity as the off-springs. When applied in an educational setting, efficiency and productivity are measured in terms of learner outcomes. Similarly, as in a marriage, there should not be competition as to who will do what. In this type of system, man attempts to maximize the minimum, i.e., the resources, instead of minimizing the maximum. Technology is not exclusively machines nor exclusively men. Hoban (1965, p. 124) asserts that technology is a complex, integrated organization of men and machines, of ideas, of procedures, and of management.

As previously indicated, there have been numerous attempts to define instructional development. Don Ely (1973, p. 524) pointed out that the definition of educational technology will vary depending on the background of the person supplying the definitions and the individuals who interpret those definitions. He suggests further that it is most difficult to arrive at a definition to be agreed upon by a consensus of those in the field. Ely purports to seek conceptual agreements rather than identical statements of a definition of educational technology. The definition of instructional technology by the President's Commission on Instructional Technology (1970, p. 5) appears to have provided the basis for conceptual agreement with respect to a working definition of the process. The commission defines instructional technology as:

> . . . a systematic way of designing, carrying out, and evaluating the total process of learning and teaching in terms of specific objectives based on research in human learning and communication, and employing a combination of human and non-human resources to bring about more effective instruction.

This definition is an amalgamation of wordy attempts to define more explicitly the nature of instructional development. Instructional development then, is a process aimed at product development. The product is to be used by people. Witt (1971) notes that interpersonal relations and group dynamics are vitally important factors in group endeavors such as are most instructional development efforts. Gustafson concurs with Witt and writes:

> . . . the most important element of instructional development is people . . . people are its energy, its insight, its product and its consumer and to engage in instructional development is to change people. To ignore any segment of the population is to invite frustration and probable failure. (1971, pp. 6–7).

Devotees of the instructional development movement have not given enough attention to the human element of the process. Barson, Haney, and Lange (1966, pp. 358–71) stated in an article, "The Heuristic Dimension of Instructional Development," that the developer should stress the human element in an instructional system. Thus, the human element in the process should receive attention.

PEOPLE INVOLVEMENT

Few instructional development efforts are likely to involve only one person working with a faculty member. The consensus of professional opinion is that instructional development efforts should be a team process. One person is not likely to possess all of the skills and the knowledge needed in this systematic process. Individuals with competencies in the following areas should participate on the team: (1) curriculum, (2) communication, (3) learning theory or educational psychology,

(4) evaluation, (5) a content specialist, (6) a media specialist and (7) an instructional developer, who should coordinate and provide leadership for team activities. However, this view that instructional development should be a team process is not universally accepted. Stephen M. Faust (1974, pp. 12–15) notes that the team concept may inhibit rather than accelerate educational progress. He writes that teachers, especially college teachers, have time constraints imposed by teaching and research activities which they feel do not permit them to devote time to instructional development activities. Faust reported on a group of teachers who permitted an instructional developer to set course objectives, determine methods of evaluation and assume full responsibility for the design of learning materials, including curriculum construction. While this arrangement proved to be a workable solution for curriculum improvement in this situation, it is unlikely to have universal applicability. Teachers who "do not have time" for involvement in curriculum revision and curriculum improvement should remember that time is the only commodity on earth which is provided equally to all.

Ivor K. Davies (1977, p. 24) notes the importance of people in instructional development efforts when he writes:

> There are two views of Instructional Development around. There's the engineering view – the people who are in love with boxes and arrows – a view in which people rarely appear. It's so much easier to manipulate things and to forget that it's people we're advising, people we're working for, people who are at the heart of the very process to which we're devoting our life.

While people are important in instructional development activities, media centers in institutions which purport to be engaged in the instructional development process place undue emphasis on hardware. In an article, "Peopleware," Billy K. Rutherford (1976, p. 32) states that educational technology is perceived of as an expensive machine-oriented field. On site visits, he found that many media directors make it obvious to the observer that educational technology is hardware-oriented and that they talk almost exclusively about hardware. Rutherford further noted that few media directors mention the need for people. These observations lead to the conclusion that although the importance of hardware need not be de-emphasized, it should be thought of as an information dissemination channel, a channel which carries stimulus materials, rather than the central focus of the process.

People involvement also includes communicating effectively with administrators and teachers about the relative advantages of the instructional development process. Since the process is relatively new and considered an innovation, communicating the advantages of systematic planning to potential users is a necessity. This idea must be diffused before

one becomes immersed in actual development activities. Without full understanding of the nature of an innovation and a positive attitude toward it, an individual may temporarily adopt the innovation, but discontinuance, a form of rejection, may soon follow. Ultimately, as Lin, *et al.* noted (1966), "it is the degree of a teacher's attitudinal acceptance of a specific innovation which determines its adoption." Thus, an important factor to be considered in the process of innovation would be the attitudes which people possess about the innovation. Considering this statement and others that support this position, how then does one explain the instructional development process to potential adoptors with the goal of promoting its acceptance? The section which follows provides a gestalt view of the process which, when communicated to teachers and administrators, may reasonably be expected to generate understanding and acceptance.

EXPLAINING THE PROCESS

The explanation of an involved process is difficult. Explaining the instructional development process is no exception. The effective explanation of this process proceeds along two lines simultaneously, each line of explanation supporting and illuminating the other: (1) the use of graphic models which present the theoretical idea or process while, at the same time, illustrating the relationships which exist among component parts; (2) the statement of generalizations, interpretations and caveats which further illuminate the more subtle meanings which may not be readily apparent from the graphic models. The explanation of instructional development to follow will be presented along these lines.

Three models of instructional development systems follow: (1) Hamreus' mini-model – a condensed version; (2) Hamreus' mini-model – a six-stage version of the model; (3) Glaser's Basic Teaching Model.

MINI-MODEL: CONDENSED VERSION

Hamreus (1970, pp. 16–18) believes that the multiplicity of activities engaged in may be classified into three stages: (1) the definition stage, (2) the design stage, and (3) the development stage. Figure 1 is a representation of the condensed version of the mini-model.

Stage I. The preparatory stage is the stage concerned with the definition of the system. This includes the identification of needed resources, both human and nonhuman. This stage is frequently bypassed by many developers, who move directly into the design stage, thereby leaving the system definition to be stated implicitly through the design.

Stage II. Decisions are made in this stage regarding performance standards and material specifications. Constraints found in the environment within which the system is to function are identified and related

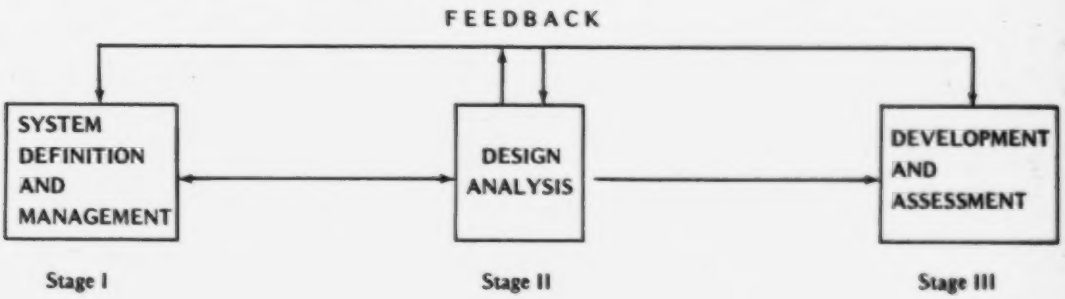

Figure 1. Major stages in a systems approach to instructional development.

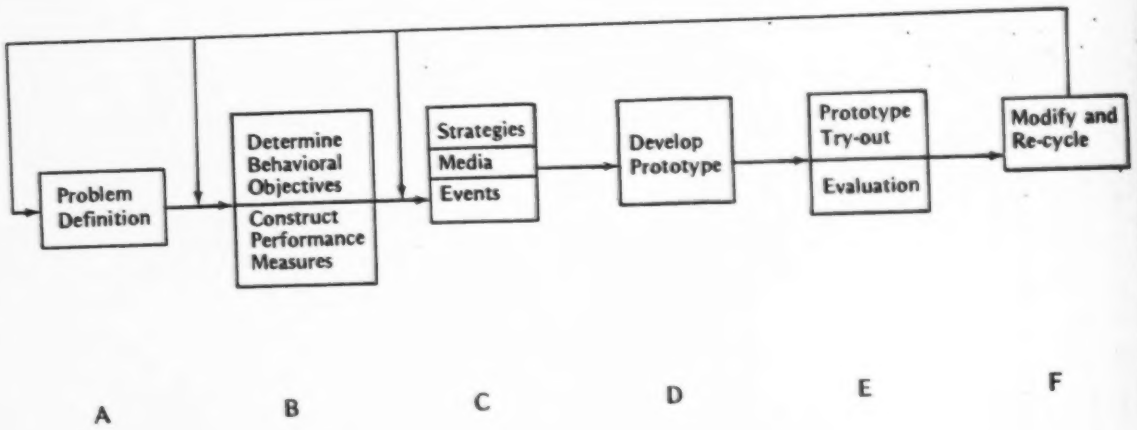

Figure 2. Mini-system flow diagram for developing instructional systems.

to these decisions.

Stage III. Development and assessment procedures are the concern in this stage. The prototype of the system is prepared including all necessary content, media and methods. The prototype is then evaluated in order to determine the extent to which the system has achieved its purpose. The model illustrated in Figure 1 is a condensed model, as previously indicated.

Figure 2 is a more detailed model illustrating the process. It concists of six components, including the three components included in Figure 1.

Box A is an examination of the problem, a systematic evaluation of the context in which the new system is to operate. Box A includes: (1) students and student characteristics; (2) the existing constraints (finance, physical facilities, personnel, materials); and (3) the people affected by the problem in addition to the students. This step incorporates the human dimension of the instructional development process.

Box B represents the construction of explicitly stated behavioral objectives upon which the remainder of the process is dependent. These objectives provide the basis for development of materials, for learning management, and for system evaluation. In this same step, tests are constructed based upon the objectives in order to determine whether or not students have attained the pre-determined outcomes specified in the objectives. Box E is particularly dependent upon these tests.

Box C illustrates three decision functions which occur at the same time. Strategy decisions are those related to the content selected, the sequence of the content, and how to present the content. Media decisions are aimed at selecting the most appropriate media to be used in presenting the content. These decisions interact to define the events. These events will produce the kinds of interactions desired between pupils, teachers and materials which will hopefully result in the objectives being met.

Box D represents the actual design of the instructional sequence. All materials to be used are gathered and decisions regarding the interweaving of these materials are made.

Box E presents the quality control function inherent in the systems approach to instructional design. The sequence is tried on a representative sample of students under conditions which realistically stimulate the final operating conditions. The evaluative aspect involves the use of the tests devised in Box B. A visual evaluation of students as the materials are being used can also be revealing.

Box F. Once data from the evaluation have been gathered, it is used to modify the system and correct system weaknesses. This process is cyclical in nature and occurs continually so that the efficiency of the

Figure 3. Basic Teaching Model.

system can be monitored. This is known as formative evaluation.

BASIC TEACHING MODEL

Glasser's model (1968, pp. 11–18), perhaps the simplest and most basic of the instructional development models, is composed of four basic components, as illustrated in Figure 3. The first component of the model involves the construction of explicitly stated instructional objectives. The second component involves the assessment of the students' entry behavior prior to the beginning of instruction. The third component, the instructional process, incorporates making decisions regarding instructional procedures or techniques designed to facilitate the attainment of the stated objectives. Decisions regarding use and sequence of presentation are included in this component. The last component, performance assessment, is an attempt to determine the extent to which performances specified in the objectives have been achieved. The assessment results determine the nature and extent of the recycling.

Components one and two of the model (constructing explicitly stated objectives and assessing the entering behavior of the learner) may be performed concurrently.

Certain emphasis, interpretations and caveats which apply to the instructional development process, as presented in the models, are in order.

First, it may be emphasized that the instructional development process is non-linear and is a system which has no formal points for beginning or ending. The lines on the graphic models are not uni-directional and thereby the concept of linearity is negated; further, since instructional development efforts may begin at various stages of the process and are constantly monitored, reassessed and recycled, there is no fixed beginning, no fixed ending. Robert L. Baker and Richard E. Schutz (1971, p. xv) write in regard to this:

> Educational development, unlike educational research, has no prescribed methodology so that fixed starting and ending points in development activities are difficult to identify.

This interpretation is also applicable to instructional development.

Second, the importance of decision-making based on evidence needs emphasis. Dale Hamreus explicitly states that the major weakness in the systems process is the inability of team members to make decisions on the basis of empirical evidence as procedures are selected to achieve objectives. He notes that decisions usually are made on the basis of past experiences.

A third emphasis is the desirability of recognizing the instructional development concept as having a much broader scope than the media concept. Media fall within the parameters of instructional development and serve as vehicles by which teachers achieve desired instructional outcomes.

This relationship is clearly illustrated in Box C of the mini-model (Figure 2). Objectives should be analyzed in terms of the learning performances expected of students. This analysis assists the developer in media selection. If an objective requires students to describe a process which involves motion, then a medium utilizing motion should be selected. An objective may require a student to explain the results of time-lapse photography; a film which shows time-lapse would be appropriate to use in this situation. It cannot be overemphasized that while media and media support services may well provide the means for more inclusive development efforts, these services are only a part of the total instructional development process.

Fourth, the stage in the process at which objectives should be written should receive careful attention. Writing objectives prior to assessing the entering behavior of the learner can result in the presence of students in a learning situation who already possess a mastery of content materials before instruction begins. In this connection, it should be emphasized that entering behavior should not be confused with mental ability. Entering behavior refers to behavioral evidence of the individual's mastery of content material before instruction; mental ability refers to potential to learn. Should objectives be prepared before assessing the entering behavior of the learners, a pre-test should be administered in order to determine not only what content material the student has mastered, but also whether the student has prerequisites, abilities, and skills necessary for a mastery of the behaviors specified in the objectives. However, writing objectives before assessing entering behavior is a defensible practice when the teacher has taught the course over a period of years and the characteristics of the student population have not changed drastically during this period of time. The perceptive teacher's understanding of the basic elements in the learning situation permits this type of pre-planning.

PRACTICAL SUGGESTIONS

The heuristics of instructional development serve as a point of departure for developers as they prepare to work with teachers. These heuristics also serve as a guide for the developer as the work continues with teachers throughout the various stages of the development process. Among the more important heuristics are: (1) learn the teacher first; (2) seek out dirty jobs; (3) do not let words get in the way; and (4) proceed on the basis of agreement (Barson, *et al.*, pp. 358–371). Proceeding on the basis of agreement is essential if the developer expects to establish an atmosphere of trust and if the developer is to continue working productively with the teacher. While these heuristics may seem obvious to experienced developers, they are easier to verbalize than to

practice and consequently are followed by few inexperienced developers.

Some developers, for a variety of reasons, look for new techniques and a high degree of mechanical sophistication when working with teachers. This quest should not eliminate the use of those older practices that have been found to be effective. In selecting techniques, a common sense yardstick is that of selecting the technique that gets the instructional job done in a way that benefits the learner while costing less in time and in human and nonhuman resources. As Mager stated, the competent developer doesn't give a rusty zipper about whether the procedures he is using are old or not. He cares only whether they work.

A successful developer is a change agent. A change agent, as defined by Rogers and Shoemaker, is a

> professional who influences innovation-decisions in a direction deemed desirable by a change agency. He usually seeks to obtain the adoption of new ideas, but he may also attempt to slow down diffusion and prevent the adoption of what he believes are undesirable innovations (1971, p. 35).

The developer realizes that too rapid a rate of change is neither good for individuals within an organization nor good for the organization. He is aware that change must be administered in the right place, at the right time and in proper dosage. The developer, in this sense, diagnoses, prescribes and administers change.

As a change agent, the developer should study the situation he wishes to change. He should be aware of the forces in the organization which can hinder the change process. These forces may be classified as restraining forces, driving forces and neutral forces (Lippitt, 1971). Restraining forces are those which hinder the desired change. Driving forces are those which facilitate the change and thereby are considered positive and an asset for bringing about the desired change. Neutral forces neither impede nor foster change. These forces may be human as well as nonhuman. For example, if a developer in working with a teacher on curriculum revision found that the teacher had a written list of explicitly stated behavioral objectives and that the tests attempted to measure all terminal performances specified in the objectives, the list of objectives and the tests may be considered positive forces in the sense they can be used to assist in bringing about curriculum revision. The teacher's desire to improve instruction is a positive force in this change effort. Similarly, flaws in instructional technique and the omission of feedback would be categorized as restraining forces.

As the developer studies the situation he wishes to change, he must examine carefully the organizational structure in which change is to take place. He should attempt to increase the effectiveness of the driving forces, reduce the influence of the restraining forces and modify

neutral forces so that they become driving forces. Additionally, the change initiator must consider the magnitude of the change. Magnitude relates directly to the level of financial and administrative support needed, as well as to whether the proposed change is within the purview of the initiator of the proposed change. A basic question which the developer should ask the teacher is, "Do you have the authority to make this change?" This question should be asked in situations which require major changes in curriculum, materials, facilities, or procedures. A teacher wishing to revise completely a course including objectives should be asked this or a similar question.

Strategies employed in solving instructional problems will vary from organization to organization depending upon the constraints imposed on the organization. However, techniques for working with people will not change proportionately. The suggestions which follow may prove useful to the developer in working with his client. The developer should:

1. Avoid, whenever possible, educational jargon peculiar to the field of educational technology. Teachers may not have this jargon in their functional vocabularies, with the result that communication is impeded rather than improved;
2. Develop good listening habits and skills. Let the client do most of the talking, especially in the early stages of curriculum revision. The client will reveal the real educational problem, sooner or later, directly or indirectly;
3. Ask probing questions of the client. These questions should lead the client to understand more clearly what has to be done. Answers to these questions should also provide the developer a deeper insight into the nature and source of the problem;
4. Create an atmosphere of mutual trust with the client. This atmosphere is necessary if the developer is to work successfully with the client. Confrontations and highly critical behavior should be avoided;
5. Remember that face-to-face communication is superior to phone calls and written communications.

No matter what is to be done and how much is to be done regarding curriculum revision, the basis of developer's success depends largely on his skill in communicating with the teacher.

SUMMARY AND COMMENTARY

Film, radio, television and other media forms have been used in classroom instruction for quite some time. However, they represent only the hardware dimension of technology, and usually are introduced after instruction has been planned. The optimum goal of planning instruction to achieve maximum results utilizing available resources is rarely achieved under this circumstance. A systematic process purported to be valuable in achieving maximum results in the classroom is instructional development. Many attempts have been made to define instructional development. One adequate definition of the process is that instructional development is a systematic process for designing, sequencing, implementing, evaluating, and constantly monitoring instruction with the intent of improving instructional methods, and thereby, improving learning.

Instructional development is a product oriented process. Since the product is to be used by people, considerable attention has been focused recently on the human dimensions of the process. The explanation of any process is difficult. Explaining a process in two dimensional form without implying linearity is a more difficult task. However, instructional development is considered to be non-linear in that development efforts may begin at various stages. There is no end since development activities are constantly monitored, reassessed, and recycled. Graphic models have been used to explain the instructional development process since models provide, in graphic form, a gestalt view of an idea and since models clearly show the relationships which exist between component parts.

The intricacies of instructional development are such that the developer must be aware that he will be working with people attempting to bring about instructional change. The developer, in this capacity, is a change agent and must be able to diagnose, prescribe, and administer change in the right place, at the right time, and in amounts suitable to the individual and the organization.

A developer can become a catalyst in bringing about instructional change. As a catalyst, the developer may become a central force around which the potential of technology can evolve. Robert Heinrich (1977, p. 25) in addressing the potential of technology remarked:

> When instructional technology becomes sophisticated enough to be considered an alternative rather than a complement to traditional instruction it becomes a base for the design of a new education system and a potent modifier of the present one. Standing squarely in the way, of course, is the superstructure of the present system.

Perhaps the potential of technology has not been fully realized, in part, because personnel in technology have created confusion about its nature, scope and use. Jargon in the field is increasing at an alarming

rate and likely contributes to the confusion. Technologists often fail to communicate with each other, fail to communicate with administrators, in particular and the public, in general. The confusion and communication failure undoubtedly has slowed progress in the use of technology. Richard Gilky (1976, pp. 8–11) points out that the public considers technology neither a part of education's problem nor its solution. Gilky asserts that it is the responsibility of technologists to make the public aware that technology can be a part of the solution. In becoming a part of the solution, the developer should, among other things, avoid the over-use of jargon peculiar to the field of educational technology, develop good listening habits and skills, ask probing questions of the client, and remember that face-to-face communication is superior to such communication practices as telephone calls and written communication, particularly in the early stages of curriculum revision.

As an "end page" comment, it is emphasized that the presentations included in this chapter were designed to be suggestive rather than comprehensive in explaining the nature and scope of the instructional development process. It is doubtful that a single document can be truly comprehensive in treating this topic. As Haney and Ullmer observed, to say what something is all about is not necessarily to say all there is to be said about it.

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